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Blechnum ludificans Herter, an Overlooked Fern from South America

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ABSTRACT.—In this paper the authors reconsider the validity of the fern *Blechnum ludificans* Herter. Herbarium material was studied using stereoscopic microscopy, LM and SEM. The main diagnostic characters of *B. ludificans* are: pinnate to pinnate- pinnatisect pinnae, 25 or fewer pinnae per blade, the presence of glandular hairs on the pinnae, inframedial position of the coenosori, and entire rhizome scale margins. Illustrations of the diagnostic features of *B. ludificans* are provided.

Blechnum ludificans Herter is known only from the type specimen and grows only in República Oriental del Uruguay, South America. Its isotype provides information on its only known locality: Durazno, Blanquillo, "in fissuris rupium Gonwanicoum (arenisca roja), locis sibsiccis, soli expositis", leg. Herter IX. 1947, Herb. Hert. 99722, Pl.Ur.exs. 1985 (US 1917580). The isotype has two annotation labels: one by C.V.Morton 1964, "*Blechnum laevigatum* Cav.", and the other, "*Blechnum ludificans* Herter = *Blechnum laevigatum* Cav.?", by E.R. de la Sota 1969:. There is also an anonymous observation by hand that makes reference to its "abnormal form".

Blechnum auriculatum Cav. and *B. auriculatum* f. *mucronato-dentata* Ros. were cited by Herter (1950) as related to *B. ludificans*. According to Durán (1997) *B. auriculatum* Cav.and *B. australe* L. *f. mucronato-dentatum* Rosenst. are synonyms of *B. australe L. subsp. auriculatum* (Cav.) de la Sota.

During a field trip to Uruguay (in April 2004) the authors were unable to re-collect this fern in Durazno Department, probably due to habitat alteration by human activity. The aim of this study is to analyse the diagnostic characters of *Blechnum ludificans*, in order to evaluate the validity of the taxon proposed by Herter.

MATERIAL AND METHODS

The only material of *Blechnum ludificans* studied was the isotype mentioned above. In order to compare this specimen with *B. australe* subsp.

TABLE 1. Diagnostic characters of *Blechnum ludificans* and *B. australe* subsp *auriculatum*.

Characters	*B. ludificans*	*B. australe* subsp *auriculatum*
Rhizome orientation	creeping, ascending	creeping, ascending
Rhizome scales	basifixed, delotid-lanceolate, partially to totally sclerotic, entire margin	basifixed, delotid, partially to totally sclerotic, entire to laciniate margin
Blade architecture	pinnate to pinnate- pinnatisect	pinnate
Number of pinna pairs	up to 25	45 or more
Frond dimorphism	subdimorphic	subdimorphic
Blade indument	glandular hairs on rachis and pinnae surface	scarcely glandular hairs on pinnae surface
Pinna base	auriculate- mucronate	auriculate- attenuate
Indusium position	inframedial	intramarginal or medial
Spore wall sculpture	scarcely folded	scarcely folded

auriculatum, material from this species was also analysed. The pinnae were diaphanized according to the Foster technique (1934), and observations were made with a Willd M5 stereoscope and a Nikon Labophot-2 light microscope.

For LM the spores were treated with hot 3% sodium carbonate for 2 minutes and acetolyzed according to Erdtman (1960). For SEM the material was treated with hot 3% sodium carbonate (Morbelli, 1980) and coated with gold. Observations were performed with a JEOL JSMT- 100 scanning electron microscope at the Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata.

The following characters were analysed: rhizome position, scales, blade architecture, fronds dimorphism, indument, indusium position and margin, spore diameter and spore wall sculpture. Terms used to describe the indusium and rhizome position follow Lellinger (2002). Specimens examined as part of this study are listed below.

Blechnum australe L. subsp. *auriculatum* (Cav.) de la Sota

ARGENTINA: Pcia Buenos Aires, Tandil, Cerro Leones, 2/3/1946, 300 msnm, *Looser 2955* (LIL); Olavarría, Cerro "Dos Hermanas", 21/4/1947, 250 msnm, *Krapovickas 3421* (LIL); Tornquist, Sierra de la Ventana, 20/4/1945, *Krapovickas 2189* (LP); Pdo Ensenada, Punta Lara, 4/1/1940, *Dawson 933* (LIL). Pcia. Salta: Tartagal, *Meyer 916*, 12-VI-1934 (BA).

URUGUAY: Depto Durazno, Ruta 43 a 25 Km de San Gregorio de Polanco, 31/3/2004, *Giudice, Ramos Giacosa & Luna 132* (LP), Depto Tacuarembó, Gruta de los Helechos, 30/3/2004, *Giudice, Ramos Giacosa & Luna 114* (LP).

Blechnum ludificans Herter

URUGUAY: Depto. Durazno, Blanquillo, IX-1947, *Herb. Herter 99722*, (US 1917580).

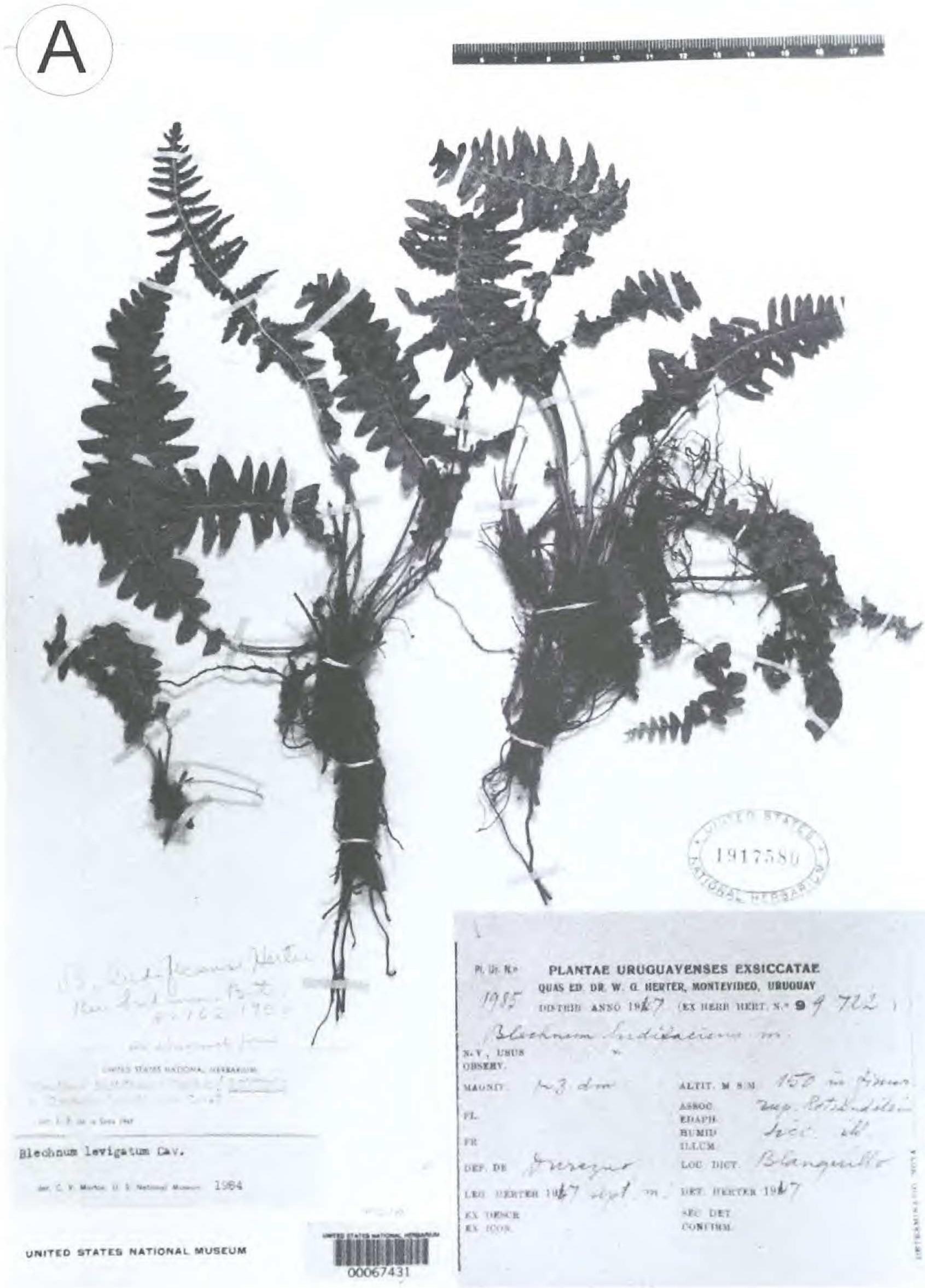
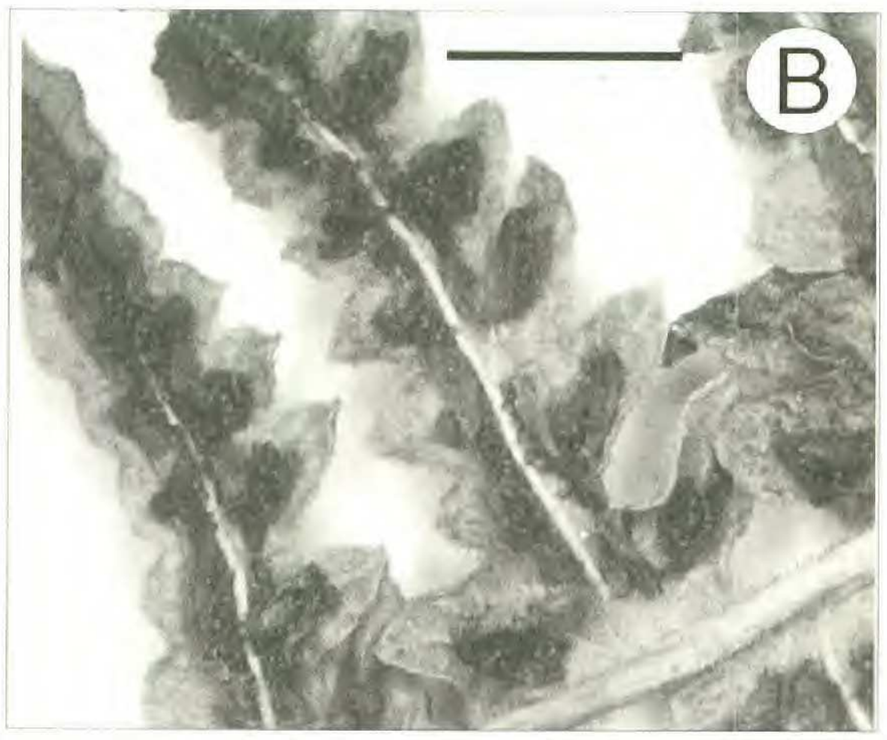
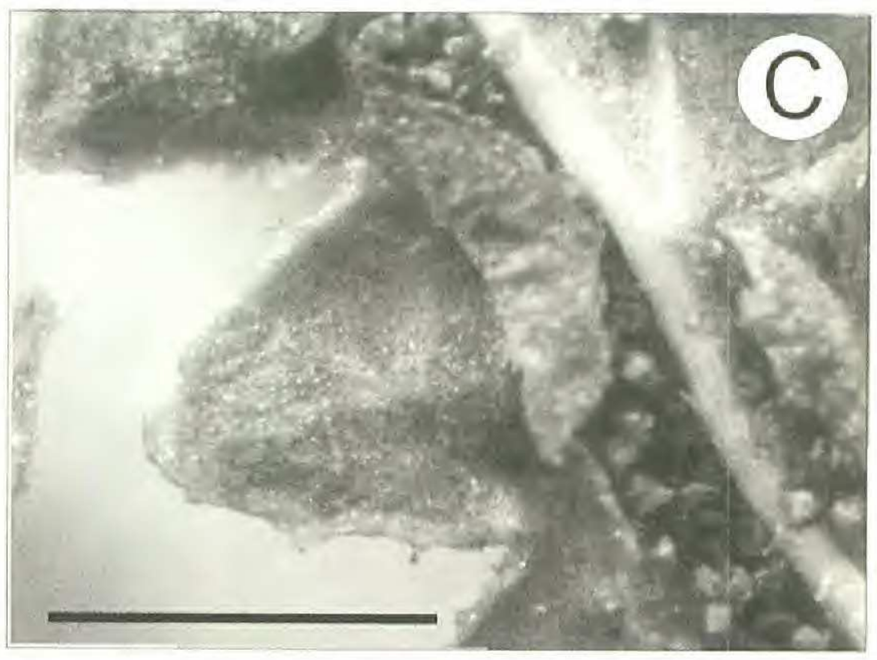


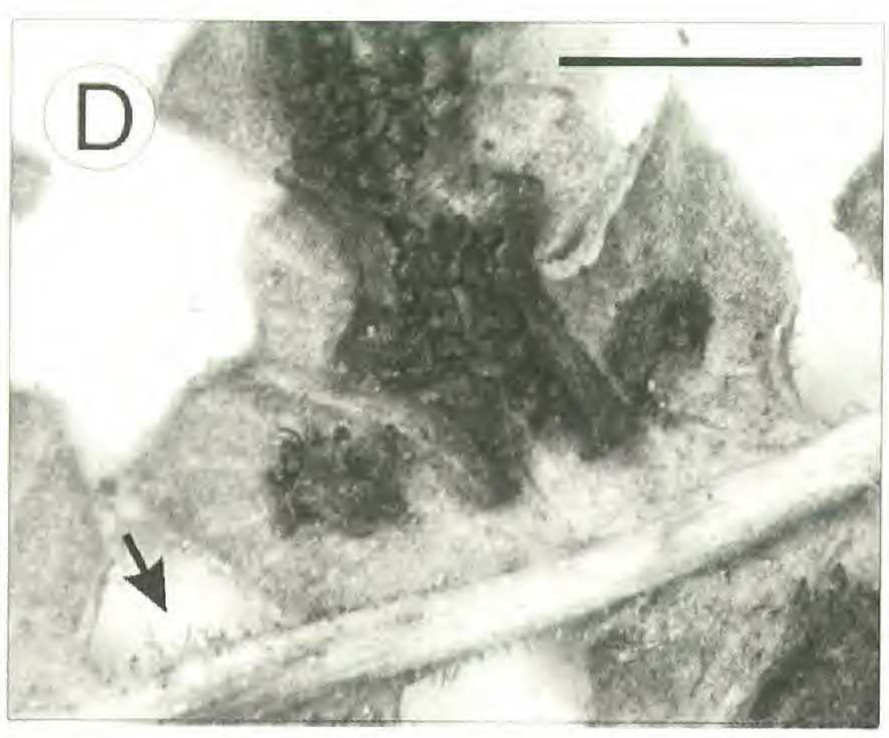
FIG. 1. Isotype *of Blechnum ludificans* (Herb. Hert. 99722, Pl.Ur.exs. 1985 [US 1917580]).

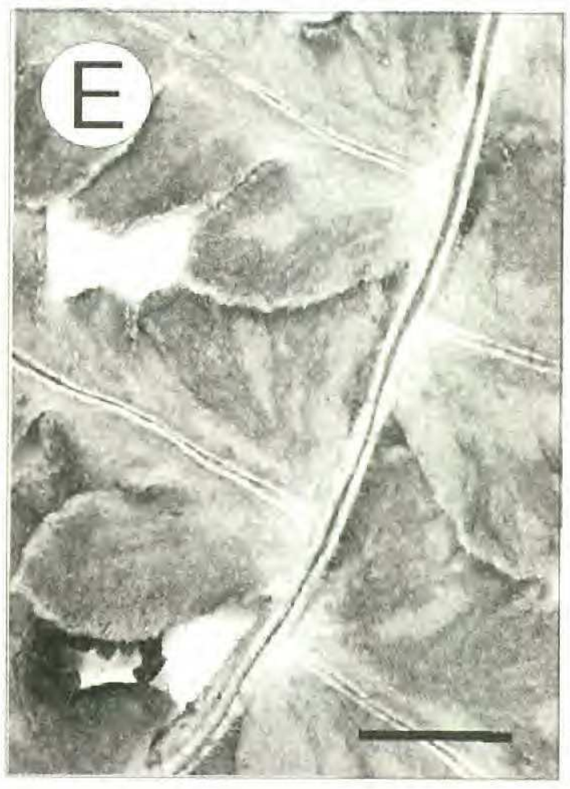
RESULTS AND DISCUSSION

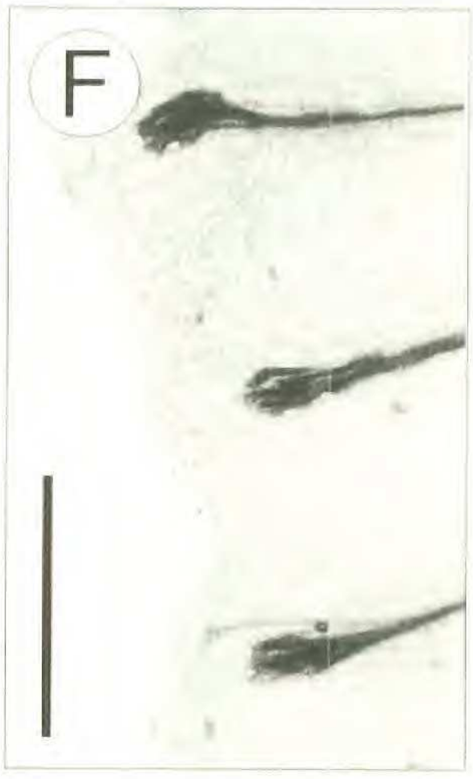
The results of our morphological comparison between *Blechnum ludificans* and *B.australe subsp auriculatum* Cav., considered by Herter (1950) to be closely related, are summarized in Table 1. Although *Blechnum ludificans* is a rare and infrequent species, the characters identified in this analysis lead us to consider it a valid taxon. The spores appeared regular in shape and size and

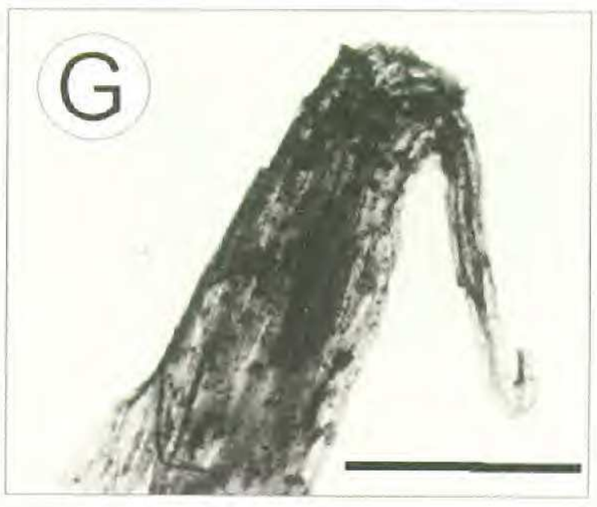


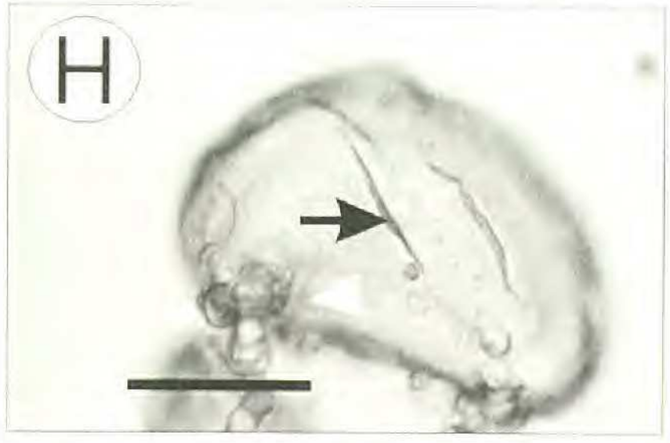












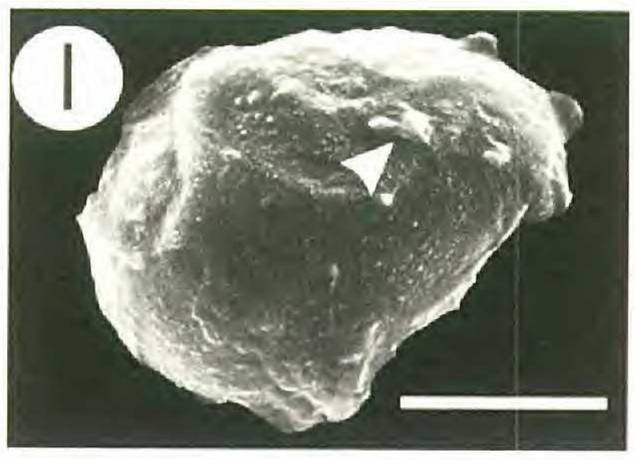


FIG. 2. *Blechnum ludificans*. **A**. Apex of fertile frond. **B**. Detail of pinnate-pinnatisect portion of fertile pinnae. **C**. Inframedial indusium position. **D**. Auriculate-mucronate segment bases; glandular hairs on the rachis indicated by arrow. **E**. Subimbricate sterile segments with auriculate-mucronate bases. **F**. Hydathodes along sterile pinna margin. **G**. Rhizome scale showing an entire margin. **H**. Spore equatorial view, occasional folds (arrow) and globules (arrowhead) are

no spore abortion was observed. According to our observations the diagnostic characters states for *Blechnum ludificans* are found in blade architecture, the number of pinnae per blade, pinnae indument, indusium position and rhizome scale margins.

The presence of pinnate to pinnate- pinnatisect fronds in *Blechnum ludificans* represent another example of blades with an additional degree of blade dissection, a character condition considered by Kramer *et al.* (1990) to be "of rare occurrence" in the genus *Blechnum*.

The following description of *Blechnum ludificans* is based on the isotype specimen at US (**Figs. 1, 2**).

Rhizome suberect, well developed and stoloniform, with scales attached by the base, deltoid-lanceolate, partially to totally sclerotic, margins entire. Fronds subdimorphic, up to 20 cm long; petioles light brown, adaxially grooved, with glandular, few-celled hairs and scattered ciliate scales with hair-like apices, attached by their bases; rachis light brown to pale yellow, adaxially grooved and with glandular hairs; blade subcoriaceous, pinnate with pinnatisect pinnae. Pinnae linear-deltoid in outline, with up to 25 pairs per blade, attenuate at the apex, with auriculate-mucronate bases and hyaline toothed margins; segments subimbricate, with lateral veins simple to once forked, ending in remarkable hydathodes, adaxial and abaxial surfaces with glandular, 2–4 celled hairs. Fertile pinnae narrower than the sterile ones; coenosori inframedial, continuous, or partially interrupted in the pinnatisect regions, indusia glabrous with erose margins. Spores monolete, polar diameter ca.19 µm, equatorial diameter ca. 31 µm; perispore folded with granular ornamentation and superficial globules of sporopolenin.

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present (LM). **I.** Spore showing folded perispore with granular ornamentation and a superficial globule (arrowhead) (SEM). Bars: A: 1 cm; B, D and E: 25 mm; C: 2 mm; F: 5 mm; G: 35 µm; H and I: 10 µm